Analytical Laboratory

13339 Hagers Ferry Road
Huntersville, NC 28078-7929
McGuire Nuclear Complex - MG03A2
Phone: 980-875-5245 Fax: 980-875-4349

Order Summary Report

Order Number: **J11030102**

Project Name: WWTS - Biweekly

Customer Name(s): Bill Kennedy, Melonie Martin, Wayne Chapman, Tom Johnson

Customer Address: 3195 Pine Hall Rd
Mailcode: Belews Steam Station
Belews Creek, NC 28012

Lab Contact: Jason C Perkins Phone: 980-875-5348

Report Authorized By: (Signature) Digitally signed by JCP7132 (111773) DN: dc=com, dc=duke-energy, dc=ent, dc=nam, ou=Accounts, ou=Personal, ou=PNTransitional, cn=JCP7132 (111773) Date: 2011.03.23 13:16:08 -04'00' **Date:** 3/23/2011

Program Comments:

FGD BiMonthly Sampling

Data Flags & Calculations:

Any analytical tests or individual analytes within a test flagged with an "X" or "1" indicate a deviation from the method quality system or quality control requirement. All results are reported on a dry weight basis unless otherwise noted.

Data Package:

This data package includes analytical results that are applicable only to the samples described in this narrative. An estimation of the uncertainty of measurement for the results in the report is available upon request. This report shall not be reproduced, except in full, without the written consent of the Analytical Laboratory. Please contact the Analytical laboratory with any questions. The order of individual sections within this report is as follows:

Job Summary Report, Sample Identification, Technical Validation of Data Package, Analytical Laboratory Certificate of Analysis, Analytical Laboratory QC Reports, Sub-contracted Laboratory Results, Customer Specific Data Sheets, Reports & Documentation, Customer Database Entries, Test Case Narratives, Chain of Custody (COC)

Certification:

The Analytical Laboratory holds the following State Certifications : North Carolina (DENR) Certificate #248, South Carolina (DHEC) Laboratory ID # 99005. Contact the Analytical Laboratory for definitive information about the certification status of specific methods.

Sample ID's & Descriptions:

Sample ID	Plant/Station	Collection Date and Time	Collected By	Sample Description
2011005006	BELEWS	09-Mar-11 8:00 AM	ILLEGIBLE	FGD Purge Eff
2011005007	BELEWS	09-Mar-11 8:05 AM	ILLEGIBLE	EQ TANK EFF.
2011005008	BELEWS	09-Mar-11 8:10 AM	ILLEGIBLE	BIOREACTOR 1 INF.
2011005009	BELEWS	09-Mar-11 8:15 AM	ILLEGIBLE	BIOREACTOR 2 INF.
2011005010	BELEWS	09-Mar-11 8:20 AM	ILLEGIBLE	BIOREACTOR 2 EFF.
2011005011	BELEWS	03-Mar-11 1:00 PM	L.DAVIS	Trip Blank
2011005012	BELEWS	03-Mar-11 1:00 PM	L.DAVIS	FILTER BLANK
2011005017	BELEWS	09-Mar-11 12:50 PM	DAVID MORRIS	BIOREACTOR 1 INF.
2011005018	BELEWS	09-Mar-11 12:50 PM	DAVID MORRIS	BIOREACTOR 1 INF. HG BLANK
2011005019	BELEWS	09-Mar-11 1:00 PM	DAVID MORRIS	BIOREACTOR 2 INF.
2011005020	BELEWS	09-Mar-11 1:00 PM	DAVID MORRIS	BIOREACTOR 2 INF. HG BLANK
2011005021	BELEWS	09-Mar-11 12:55 PM	DAVID MORRIS	BIOREACTOR 2 EFF.
2011005022	BELEWS	09-Mar-11 12:55 PM	DAVID MORRIS	BIOREACTOR 2 EFF. HG BLANK

13 Total Samples

Technical Validation Review

Checklist:

COC and .pdf report are in agreement with sample totals and analyses (compliance programs and procedures).	☑ Yes	☐ No
All Results are less than the laboratory reporting limits.	☐ Yes	☑ No
All laboratory QA/QC requirements are acceptable.	☑ Yes	☐ No
The Vendor Laboratories have been qualified by the Analytical Laboratory	Yes	

Report Sections Included:

- ☑ Job Summary Report
- ☑ Sample Identification
- ☑ Technical Validation of Data Package
- ☑ Analytical Laboratory Certificate of Analysis
- ☐ Analytical Laboratory QC Report
- ☑ Sub-contracted Laboratory Results
- ☐ Customer Specific Data Sheets, Reports, & Documentation
- ☐ Customer Database Entries
- ☐ Test Case Narratives
- ☑ Chain of Custody
- ☑ Electronic Data Deliverable (EDD) Sent Separately

Reviewed By: DataBase Administrator Date: 3/23/2011

Certificate of Laboratory Analysis

This report shall not be reproduced, except in full.

Order # J11030102

Site: FGD Purge Eff **Sample #: 2011005006**

Collection Date: 09-Mar-11 8:00 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
MERCURY (COLD VAPOR) IN WATER							
Mercury (Hg)	**309**	ug/L		5	EPA 245.1	17-Mar-11 10:22	MHH7131
TOTAL RECOVERABLE METALS BY ICP							
Boron (B)	**193**	mg/L		0.5	EPA 200.7	15-Mar-11 11:47	DJSULL1
DISSOLVED METALS BY ICP-MS							
Selenium (Se)	**107**	ug/L		10	EPA 200.8	11-Mar-11 10:34	KRICHAR
TOTAL RECOVERABLE METALS BY ICP-MS							
Arsenic (As)	**231**	ug/L		10	EPA 200.8	15-Mar-11 14:02	KRICHAR
Chromium (Cr)	**256**	ug/L		10	EPA 200.8	15-Mar-11 14:02	KRICHAR
Copper (Cu)	**216**	ug/L		10	EPA 200.8	15-Mar-11 14:02	KRICHAR
Nickel (Ni)	**257**	ug/L		10	EPA 200.8	15-Mar-11 14:02	KRICHAR
Selenium (Se)	**6200**	ug/L		20	EPA 200.8	15-Mar-11 14:02	KRICHAR
Silver (Ag)	**15.4**	ug/L		10	EPA 200.8	15-Mar-11 14:02	KRICHAR
Zinc (Zn)	**393**	ug/L		20	EPA 200.8	15-Mar-11 14:02	KRICHAR
SELENIUM SPECIATION							
Vendor Parameter	**Complete**				V_AS&C		
TOTAL DISSOLVED SOLIDS							
TDS	**16000**	mg/L		10	SM2540C	15-Mar-11 13:30	CLEEMAN

Site: EQ TANK EFF. **Sample #: 2011005007**

Collection Date: 09-Mar-11 8:05 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
MERCURY (COLD VAPOR) IN WATER							
Mercury (Hg)	**236**	ug/L		2.5	EPA 245.1	17-Mar-11 10:25	MHH7131
TOTAL RECOVERABLE METALS BY ICP							
Boron (B)	**196**	mg/L		0.5	EPA 200.7	15-Mar-11 11:55	DJSULL1
DISSOLVED METALS BY ICP-MS							
Selenium (Se)	**84.9**	ug/L		10	EPA 200.8	11-Mar-11 10:37	KRICHAR
TOTAL RECOVERABLE METALS BY ICP-MS							
Arsenic (As)	**206**	ug/L		10	EPA 200.8	15-Mar-11 13:58	KRICHAR
Chromium (Cr)	**228**	ug/L		10	EPA 200.8	15-Mar-11 13:58	KRICHAR
Copper (Cu)	**190**	ug/L		10	EPA 200.8	15-Mar-11 13:58	KRICHAR
Nickel (Ni)	**235**	ug/L		10	EPA 200.8	15-Mar-11 13:58	KRICHAR
Selenium (Se)	**5140**	ug/L		20	EPA 200.8	15-Mar-11 13:58	KRICHAR

Certificate of Laboratory Analysis

Order # J11030102

Site: EQ TANK EFF. **Sample #: 2011005007**

Collection Date: 09-Mar-11 8:05 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
TOTAL RECOVERABLE METALS BY ICP-MS							
Silver (Ag)	**17.7**	ug/L		10	EPA 200.8	15-Mar-11 13:58	KRICHAR
Zinc (Zn)	**343**	ug/L		20	EPA 200.8	15-Mar-11 13:58	KRICHAR

Site: BIOREACTOR 1 INF. **Sample #: 2011005008**

Collection Date: 09-Mar-11 8:10 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
TOTAL RECOVERABLE METALS BY ICP							
Boron (B)	**178**	mg/L		0.5	EPA 200.7	15-Mar-11 11:59	DJSULL1
DISSOLVED METALS BY ICP-MS							
Selenium (Se)	**68.2**	ug/L		10	EPA 200.8	11-Mar-11 10:41	KRICHAR
TOTAL RECOVERABLE METALS BY ICP-MS							
Arsenic (As)	**< 10**	ug/L		10	EPA 200.8	15-Mar-11 13:23	KRICHAR
Chromium (Cr)	**< 10**	ug/L		10	EPA 200.8	15-Mar-11 13:23	KRICHAR
Copper (Cu)	**< 10**	ug/L		10	EPA 200.8	15-Mar-11 13:23	KRICHAR
Nickel (Ni)	**61.9**	ug/L		10	EPA 200.8	15-Mar-11 13:23	KRICHAR
Selenium (Se)	**82.6**	ug/L		10	EPA 200.8	15-Mar-11 13:23	KRICHAR
Silver (Ag)	**< 10**	ug/L		10	EPA 200.8	15-Mar-11 13:23	KRICHAR
Zinc (Zn)	**< 20**	ug/L		20	EPA 200.8	15-Mar-11 13:23	KRICHAR
SELENIUM SPECIATION							
Vendor Parameter	**Complete**				V_AS&C		

Site: BIOREACTOR 2 INF. **Sample #: 2011005009**

Collection Date: 09-Mar-11 8:15 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
TOTAL RECOVERABLE METALS BY ICP							
Boron (B)	**177**	mg/L		0.5	EPA 200.7	15-Mar-11 12:03	DJSULL1
TOTAL RECOVERABLE METALS BY ICP-MS							
Arsenic (As)	**< 10**	ug/L		10	EPA 200.8	15-Mar-11 13:18	KRICHAR
Chromium (Cr)	**< 10**	ug/L		10	EPA 200.8	15-Mar-11 13:18	KRICHAR
Copper (Cu)	**< 10**	ug/L		10	EPA 200.8	15-Mar-11 13:18	KRICHAR
Nickel (Ni)	**12.8**	ug/L		10	EPA 200.8	15-Mar-11 13:18	KRICHAR
Selenium (Se)	**18.1**	ug/L		10	EPA 200.8	15-Mar-11 13:18	KRICHAR
Silver (Ag)	**< 10**	ug/L		10	EPA 200.8	15-Mar-11 13:18	KRICHAR
Zinc (Zn)	**< 20**	ug/L		20	EPA 200.8	15-Mar-11 13:18	KRICHAR

Certificate of Laboratory Analysis

Order # J11030102

Site: BIOREACTOR 2 EFF. **Sample #: 2011005010**

Collection Date: 09-Mar-11 8:20 AM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
MERCURY (COLD VAPOR) IN WATER							
Mercury (Hg)	**< 1**	ug/L		1	EPA 245.1	17-Mar-11 10:27	MHH7131
TOTAL RECOVERABLE METALS BY ICP							
Boron (B)	**168**	mg/L		0.5	EPA 200.7	15-Mar-11 12:07	DJSULL1
TOTAL RECOVERABLE METALS BY ICP-MS							
Arsenic (As)	**< 5**	ug/L		5	EPA 200.8	15-Mar-11 13:04	KRICHAR
Chromium (Cr)	**< 5**	ug/L		5	EPA 200.8	15-Mar-11 13:04	KRICHAR
Copper (Cu)	**< 5**	ug/L		5	EPA 200.8	15-Mar-11 13:04	KRICHAR
Nickel (Ni)	**< 5**	ug/L		5	EPA 200.8	15-Mar-11 13:04	KRICHAR
Selenium (Se)	**< 5**	ug/L		5	EPA 200.8	15-Mar-11 13:04	KRICHAR
Silver (Ag)	**5.05**	ug/L		5	EPA 200.8	15-Mar-11 13:04	KRICHAR
Zinc (Zn)	**< 10**	ug/L		10	EPA 200.8	15-Mar-11 13:04	KRICHAR
SELENIUM SPECIATION							
Vendor Parameter	**Complete**				V_AS&C		

Site: Trip Blank **Sample #: 2011005011**

Collection Date: 03-Mar-11 1:00 PM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
TOTAL RECOVERABLE METALS BY ICP							
Boron (B)	**< 0.05**	mg/L		0.05	EPA 200.7	15-Mar-11 11:43	DJSULL1
TOTAL RECOVERABLE METALS BY ICP-MS							
Arsenic (As)	**< 1**	ug/L		1	EPA 200.8	15-Mar-11 12:59	KRICHAR
Chromium (Cr)	**< 1**	ug/L		1	EPA 200.8	15-Mar-11 12:59	KRICHAR
Copper (Cu)	**< 1**	ug/L		1	EPA 200.8	15-Mar-11 12:59	KRICHAR
Nickel (Ni)	**< 1**	ug/L		1	EPA 200.8	15-Mar-11 12:59	KRICHAR
Selenium (Se)	**< 1**	ug/L		1	EPA 200.8	15-Mar-11 12:59	KRICHAR
Silver (Ag)	**< 1**	ug/L		1	EPA 200.8	15-Mar-11 12:59	KRICHAR
Zinc (Zn)	**< 2**	ug/L		2	EPA 200.8	15-Mar-11 12:59	KRICHAR
SELENIUM SPECIATION							
Vendor Parameter	**Complete**				V_AS&C		

Site: FILTER BLANK **Sample #: 2011005012**

Collection Date: 03-Mar-11 1:00 PM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
DISSOLVED METALS BY ICP-MS							
Selenium (Se)	**< 2**	ug/L		2	EPA 200.8	11-Mar-11 10:45	KRICHAR

Certificate of Laboratory Analysis

Order # J11030102

Site: BIOREACTOR 1 INF. **Sample #: 2011005017**
Collection Date: 09-Mar-11 12:50 PM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
MERCURY 1631							
Vendor Parameter	**Complete**				V_BRAND		

Site: BIOREACTOR 1 INF. HG BLANK **Sample #: 2011005018**
Collection Date: 09-Mar-11 12:50 PM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
MERCURY 1631							
Vendor Parameter	**Complete**				V_BRAND		

Site: BIOREACTOR 2 INF. **Sample #: 2011005019**
Collection Date: 09-Mar-11 1:00 PM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
MERCURY 1631							
Vendor Parameter	**Complete**				V_BRAND		

Site: BIOREACTOR 2 INF. HG BLANK **Sample #: 2011005020**
Collection Date: 09-Mar-11 1:00 PM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
MERCURY 1631							
Vendor Parameter	**Complete**				V_BRAND		

Site: BIOREACTOR 2 EFF. **Sample #: 2011005021**
Collection Date: 09-Mar-11 12:55 PM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
MERCURY 1631							
Vendor Parameter	**Complete**				V_BRAND		

Site: BIOREACTOR 2 EFF. HG BLANK **Sample #: 2011005022**
Collection Date: 09-Mar-11 12:55 PM Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
MERCURY 1631							
Vendor Parameter	**Complete**				V_BRAND		

APPLIED SPECIATION
AND CONSULTING, LLC

18804 Northcreek Parkway Bothell, WA, 98011
Tel: (425) 483-3300 Fax: (425) 483-9818
www.appliedspeciation.com

March 21, 2011

Jay Perkins
Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd.
Huntersville, NC 28078
(704) 875-5245

Project: Belews – FGD WWTS (2010, Bi-Weekly Sampling) (LIMS # J11030102)

Dear Mr. Perkins,

Attached is the report associated with four (4) aqueous samples submitted for selenium speciation analysis on March 10, 2011. The samples were received on March 11, 2011 in a sealed cooler at -0.5^{o}C. Selenium speciation analysis was performed via ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS). Any analytical issues associated with the analysis are addressed in the following report.

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

Russell Gerads
Vice President
Applied Speciation and Consulting, LLC

Applied Speciation and Consulting, LLC

Report prepared for:

Jay Perkins
Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd.
Huntersville, NC 28078

Project: Belews – FGD WWTS (2010, Bi-Weekly Sampling) (LIMS # J11030102)

March 21, 2011

1. Sample Reception

Four (4) aqueous samples in 125mL HDPE bottles (provided by Applied Speciation and Consulting) were submitted for selenium speciation analysis on March 10, 2011. The samples were received on March 11, 2011 in a sealed container at -0.5^{o}C.

The samples were received in a laminar flow clean hood void of trace metals contamination and ultra-violet radiation. Upon reception, the samples were designated discrete sample identifiers. An aliquot of each sample was filtered (0.45µm) and these filtrates were stored in a secure, monitored cryofreezer (maintained at a temperature of -80^{o}C) until selenium speciation analysis could be performed via ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS).

2. Sample Preparation

All sample preparation is performed in laminar flow clean hoods known to be free from trace metals contamination. All applied water for dilutions and sample preservatives are monitored for contamination to account for any biases associated with the sample results.

Selenium Speciation Analysis by IC-ICP-DRC-MS Prior to analysis, an aliquot of each sample was filtered with a syringe filter (0.45µm) and injected directly into a sealed autosampler vial. No further sample preparation was performed as any chemical alteration of the samples may shift the equilibrium of the system resulting in changes in speciation ratios.

3. Sample Analysis

All sample analysis is precluded by a minimum of a five-point calibration curve spanning the entire concentration range of interest. Calibration curves are performed at the beginning of each analytical day. All calibration curves, associated with each species of interest, are standardized by linear regression resulting in a response factor. All sample results are **instrument blank corrected** to account for any operational biases associated with the analytical platform.

Prior to sample analysis, all calibration curves are verified using second source standards which are identified as initial calibration verification standards (ICV).

Ongoing instrument performance is identified by the analysis of continuing calibration verification standards (CCV) and continuing calibration blanks (CCB) at a minimal interval of every ten analytical runs.

Selenium Speciation Analysis by IC-ICP-DRC-MS All samples for selenium speciation analysis were analyzed by ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS) on March 11, 2011. An aliquot of each sample is injected onto an anion exchange column and mobilized by a basic (pH > 7) gradient. The eluting selenium species are then introduced into a radio frequency (RF) plasma where energy-transfer processes cause desolvation, atomization, and ionization. The ions are extracted from the plasma through a differentially-pumped vacuum interface and travel through a pressurized chamber (DRC) containing a specific reactive gas which preferentially reacts with interfering ions of the same target mass to charge ratios (m/z). A solid-state detector detects ions transmitted through the mass analyzer and the resulting current is processed by a data handling system.

Retention times for each eluting species are compared to known standards for species identification.

4. Analytical Issues

The overall analyses went very well and no analytical issues were encountered. All quality control parameters associated with these samples were within acceptance limits.

The estimated method detection limits (eMDLs) for selenite, selenate, and selenocyanate are generated from replicate analyses of the lowest standard in the calibration curve. Not all selenium species are present in preparation blanks; therefore, eMDL calculations based on preparation blanks are artificially biased low.

The eMDL for methylseleninic acid and selenomethionine is calculated from the average eMDL of selenite, selenate, and selenocyanate. The calibration does not contain methylseleninic acid or selenomethionine due to impurities in these standards which would bias the results for other selenium species.

If you have any questions or concerns regarding this report, please feel free to contact me.

Sincerely,

Russell Gerads
Vice President
Applied Speciation and Consulting, LLC

Selenium Speciation Results for Duke Energy
Project Name: Belews - FGD WWTS (2010, Bi-Weekly Sampling)
Contact: Jay Perkins
LIMS #J11030102

Date: March 21, 2011
Report Generated by: Russell Gerads
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Se(IV)	Se(VI)	SeCN	MeSe(IV)	SeMe	Unknown Se Species (n)
FGD Purge Eff	28.6	70.8	ND (<3.0)	ND (<3.0)	ND (<3.0)	0 (0)
BioReactor 1 Inf	5.87	60.9	ND (<0.76)	0.89	ND (<0.75)	0 (0)
BioReactor 2 Eff	ND (<0.60)	ND (<0.90)	ND (<0.76)	ND (<0.75)	ND (<0.75)	0 (0)
Metals Trip Blk	ND (<0.12)	ND (<0.18)	ND (<0.15)	ND (<0.15)	ND (<0.15)	0 (0)

All results reflect the applied dilution and are reported in µg/L
ND = Not detected at the applied dilution
SeCN = Selenocyanate
MeSe(IV) = Methylseleninic acid
SeMe = Selenomethionine
Unknown Se Species = Total concentration of all unknown Se species observed by IC-ICP-MS
n = number of unknown Se species observed

Selenium Speciation Results for Duke Energy
Project Name: Belews - FGD WWTS (2010, Bi-Weekly Sampling)
Contact: Jay Perkins
LIMS #J11030102

Date: March 21, 2011
Report Generated by: Russell Gerads
Applied Speciation and Consulting, LLC

Quality Control Summary - Preparation Blank Summary

Analyte (µg/L)	PBW1	PBW2	PBW3	PBW4	Mean	StdDev	eMDL*	eMDL 10x	eMDL 50x	eMDL 200x
Se(IV)	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.12	0.60	2.4
Se(VI)	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.18	0.90	3.6
SeCN	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.15	0.76	3.0
MeSe(IV)	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.15	0.75	3.0
SeMe	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.15	0.75	3.0

eMDL = Estimated Method Detection Limit
*Please see narrative regarding eMDL calculations

Quality Control Summary - Certified Reference Materials

Analyte (µg/L)	CRM	True Value	Result	Recovery
Se(IV)	ICV	9.57	9.59	100.2
Se(VI)	ICV	9.48	9.05	95.4
SeCN	ICV	8.92	8.87	99.5
MeSe(IV)	ICV	6.47	5.73	88.6
SeMe	ICV	9.32	8.42	90.4

Selenium Speciation Results for Duke Energy
Project Name: Belews - FGD WWTS (2010, Bi-Weekly Sampling)
Contact: Jay Perkins
LIMS #J11030102

Date: March 21, 2011
Report Generated by: Russell Gerads
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Quality Control Summary - Matrix Duplicates

Analyte (µg/L)	Sample ID	Rep 1	Rep 2	Mean	RPD
Se(IV)	Batch QC	343.7	343.4	343.6	0.1
Se(VI)	Batch QC	245.9	241.2	243.5	1.9
SeCN	Batch QC	ND (<3.0)	ND (<3.0)	NC	NC
MeSe(IV)	Batch QC	4.8	6.1	5.45	22.7
SeMe	Batch QC	ND (<3.0)	ND (<3.0)	NC	NC

ND = Not detected at the applied dilution
NC = Value was not calculated due to one or more concentrations below the eMDL

Quality Control Summary - Matrix Spike/ Matrix Spike Duplicate

Analyte (µg/L)	Sample ID	Spike Conc	MS Result	Recovery	Spike Conc	MSD Result	Recovery	RPD
Se(IV)	Batch QC	1112	1646	117.1	1112	1638	116.4	0.5
Se(VI)	Batch QC	1009	1291	103.8	1009	1276	102.3	1.2
SeCN	Batch QC	915.0	790.0	86.3	915.0	771.4	84.3	0.0

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd
Huntersville, N. C. 28078
(704) 875-5245
Fax: (704) 875-4349

[18]Page 1 of 2
DISTRIBUTION
ORIGINAL to LAB,
COPY to CLIENT

Analytical Laboratory Use Only

LIMS # J11030102 | Sample Class ASHBAS other | Samples Originating From NC X SC ___

Logged By cpb | Date & Time 3-10-11 1238 | SAMPLE PROGRAM: Water ___ Ground ___ NPDES ___ Drinking Water ___ UST ___ RCRA Waste ___

Vendor AS&C
PO#SW01.1894

Cooler Temp (C) < 1

AS&C
PO#133241

Customer must Complete

1)Project Name: Belews - FGD WWTS (2010, Bi-Weekly Sampling) | 2)Phone No:

2) Client: Bill Kennedy, Melonie Martin, Wayne Chapman, Tom Johnson * | 4)Fax No:

5)Business Unit: | 6)Process: | Mail Code:

8)Oper. Unit: | 9)Res. Type: | 10)Reso. Center:

[15]Preserv.: 1=HCl 2=H_2SO_4 3=HNO_3 4=Ice 5=None

Customer to complete all appropriate non-shaded areas.

Sampling conducted: 2nd and 4th Wednesday

[16]Analyses Required

LAB USE ONLY [11]Lab ID	Se Speciation Bottle ID	[13]Sample Description or ID	Date	Time	Signature	[17]Comp.	[18]Grab	TDS (PRISM)	Hg - 245.1	Metals*	Se, soluble	Se, speciation - vendor to AS&C (important to place filled bottle back into both baggies)
2011005006	B08843	FGD Purge Eff	3/9/11	8:00	J-Tall			1	1	1	1	1
07		EQ Tank Eff.	3/9/11	8:05	J-Tall				1	1	1	
08	B08165	BioReactor 1 Inf	3/9/11	8:10	J-Tall					1	1	1
09		BioReactor 2 Inf	3/9/11	8:15	J-Tall					1		
10	B06461	BioReactor 2 Eff	3/9/11	8:20	J-Tall				1	1		1
12		Filter Blk	3/3/11	1300	R. Davis						1	
11	B08165	Metals Trip Blk	3/3/11	1300	R. Davis					1		1

Customer to complete appropriate columns to right

Customer to sign & date below - fill out from left to right.

1) Relinquished By	Date/Time	2) Accepted By Dave Mon	Date/Time 3-9-11 1305
3) Relinquished By Dave Mon 3-9-11	Date/Time 1500	4) Accepted By Cindy Knox	Date/Time 3-9-11 1500
5)Relinquished By	Date/Time	6)Accepted By:	Date/Time
7)Relinquished By cpb	Date/Time 3-10-11 1300	8)Accepted By:	Date/Time
9)Seal/Locked By cpb	Date/Time 3-10-11	10) Seal/Lock Opened By	Date/Time
11)Seal/Locked By	Date/Time	12)Seal/Lock Opened By Nancy Culbria	Date/Time 3/11/11 9:30 -0.5°C

Comments: * Metals=As, Ag, B, Cu, Cr, Ni, Se, Zn * thomas.c.johnson@siemens.com

Customer, IMPORTANT! Please indicate desired turnaround.

[22]Requested Turnaround
14 Days ___
7 Days 3-21-11
48 Hr ___
*Other ___
* Add. Cost Will Apply

March 20, 2011

Duke Energy
ATTN: Jay Perkins
Scientific Support-Laboratory
13339 Hagers Ferry Road
Huntersville NC 28078
jcperkins@duke-energy.com
labcustomer@duke-energy.com

RE: Project DUK-HV1001 Client Project: J11030102

Dear Mr. Perkins,

On March 11, 2011, Brooks Rand Labs (BRL) received three (3) flue gas desulfurization (FGD) waste water samples and three (3) field blanks (one from each related FGD sample site). All samples were logged-in for total mercury (Hg) analysis and were received, prepared, analyzed, and stored according to BRL SOPs and EPA methodology.

The results were blank-corrected as described in the calculations section of the applicable SOP(s) and may be evaluated using adjusted reporting limits to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific detection limits and other details. Aside from concentration qualifiers, all data was reported without qualification and all quality assurance criteria were satisfied.

The analysis of the low calibration standards (1100171-CAL1 & 1100171-CAL2) recovered above acceptance limits. The low calibration standards were re-analyzed as 1100171-CAL7 and 1100171-CAL8, respectively. The re-analyses were reported and no additional corrective action was required.

The analysis of method blank B110374-BLK1 produced a result that was determined to be a Grubb's Outlier (0.19 ng/L). This blank result was omitted and not used in any calculations. Therefore, the results were blank-corrected with the average of the three remaining method blank results.

BRL, an accredited laboratory, certifies the reported results of all analyses for which BRL is NELAP accredited meet all NELAP requirements. For more details, see the *Report Information* page of the report. Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Tiffany Stilwater
Project Manager
tiffany@brooksrand.com

Lydia Greaves
Project Coordinator
lydia@brooksrand.com

Project ID: DUK-HV1101
PM: Tiffany Stilwater

Client PM: Jay Perkins
Client PO: 141391

Report Information

Laboratory Accreditation

BRL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BRL is also certified by many other states to perform environmental analyses. For a current list of our accreditations /certifications, please visit our website at <http://www.brooksrand.com/default.asp?contentID=586>. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

BLK	method blank	**MS**	matrix spike
BRL	Brooks Rand Labs	**MSD**	matrix spike duplicate
BS	laboratory fortified blank	**ND**	non-detect
CAL	calibration standard	**NR**	non-reportable
CCV	continuing calibration verification	**PS**	post preparation spike
COC	chain of custody record	**REC**	percent recovery
CRM	certified reference material	**RPD**	relative percent difference
D	dissolved fraction	**RSD**	relative standard deviation
DUP	duplicate	**SCV**	secondary calibration verification
ICV	initial calibration verification	**SOP**	standard operating procedure
MDL	method detection limit	**SRM**	standard reference material
MRL	method reporting limit	**T**	total recoverable fraction

Definition of Data Qualifiers

(Effective 9/23/09)

B Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
E An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H Holding time and/or preservation requirements not met. Result is estimated.
J Estimated value. A full explanation is presented in the narrative.
J-M Duplicate precision (RPD) for associated QC sample was not within acceptance criteria. Result is estimated.
J-N Spike recovery for associated QC sample was not within acceptance criteria. Result is estimated.
M Duplicate precision (RPD) was not within acceptance criteria. Result is estimated.
N Spike recovery was not within acceptance criteria. Result is estimated.
R Rejected, unusable value. A full explanation is presented in the narrative.
U Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.

These qualifiers are based on those previously utilized by Brooks Rand, Ltd., those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses; USEPA; July 2002. These supersede all previous qualifiers ever employed by BRL.

Project ID: DUK-HV1101
PM: Tiffany Stilwater

Client PM: Jay Perkins
Client PO: 141391

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
BioReactor 1 Inf	1111043-01	FGD Wastewater	Sample	03/09/2011	03/11/2011
Hg Blk BioReactor 1 Inf	1111043-02	DIW	Field Blank	03/09/2011	03/11/2011
BioReactor 2 Inf	1111043-03	FGD Wastewater	QC Sample	03/09/2011	03/11/2011
Hg Blk BioReactor 2 Inf	1111043-04	DIW	Field Blank	03/09/2011	03/11/2011
BioReactor 2 Eff	1111043-05	FGD Wastewater	Sample	03/09/2011	03/11/2011
Hg Blk BioReactor 2 Eff	1111043-06	DIW	Field Blank	03/09/2011	03/11/2011

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
Hg	Water	EPA 1631	03/15/2011	03/17/2011	B110374	1100171

Project ID: DUK-HV1101
PM: Tiffany Stilwater

Client PM: Jay Perkins
Client PO: 141391

Sample Results

Sample	Analyte	Report Matrix	Fraction	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
BioReactor 1 Inf										
1111043-01	Hg	FGD Wastewater	T	74.3		1.52	4.04	ng/L	B110374	1100171
BioReactor 2 Eff										
1111043-05	Hg	FGD Wastewater	T	4.70		0.60	1.60	ng/L	B110374	1100171
BioReactor 2 Inf										
1111043-03	Hg	FGD Wastewater	T	43.0		0.61	1.62	ng/L	B110374	1100171
Hg Blk BioReactor 1 Inf										
1111043-02	Hg	DIW	T	0.15	U	0.15	0.41	ng/L	B110374	1100171
Hg Blk BioReactor 2 Eff										
1111043-06	Hg	DIW	T	0.15	U	0.15	0.40	ng/L	B110374	1100171
Hg Blk BioReactor 2 Inf										
1111043-04	Hg	DIW	T	0.15	U	0.15	0.40	ng/L	B110374	1100171

Project ID: DUK-HV1101
PM: Tiffany Stilwater

Client PM: Jay Perkins
Client PO: 141391

Accuracy & Precision Summary

Batch: B110374
Lab Matrix: Water
Method: EPA 1631

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B110374-SRM1	**Certified Reference Material (1111049, NIST 1641d 1000x dilution)**						
	Hg		15.68	16.86	ng/L	108% 85-115	
B110374-MS1	**Matrix Spike (1111043-03)**						
	Hg	42.95	121.0	159.2	ng/L	96% 71-125	
B110374-MSD1	**Matrix Spike Duplicate (1111043-03)**						
	Hg	42.95	123.1	172.1	ng/L	105% 71-125	8% 24

Method Blanks & Reporting Limits

Batch: B110374
Matrix: Water
Method: EPA 1631
Analyte: Hg

Sample	Result	Units
B110374-BLK1	0.04	ng/L
B110374-BLK2	0.07	ng/L
B110374-BLK3	0.06	ng/L

Average: 0.06 **Standard Deviation:** 0.02 **MDL:** 0.15
Limit: 0.50 **Limit:** 0.10 **MRL:** 0.41

Project ID: DUK-HV1101
PM: Tiffany Stilwater

Client PM: Jay Perkins
Client PO: 141391

Instrument Calibration

Sequence: 1100171
Instrument: THG-05
Date: 03/17/2011
Analyte: Hg

Total Mercury and Mercury Speciation by CVAFS
Method: EPA 1631

Lab ID	True Value	Result	Units	REC & Limits	
1100171-IBL1		7.43	pg of Hg		
1100171-IBL2		6.70	pg of Hg		
1100171-IBL3		5.44	pg of Hg		
1100171-IBL4		6.06	pg of Hg		
1100171-CAL3	500.0	517.9	pg of Hg	104%	
1100171-CAL4	2500	2625	pg of Hg	105%	
1100171-CAL5	10000	9967	pg of Hg	100%	
1100171-ICV1	1568	1686	pg of Hg	108%	85-115
1100171-CCB1		29.6	pg of Hg		
1100171-CAL7	100.0	92.45	pg of Hg	92%	
1100171-CCB2		14.2	pg of Hg		
1100171-CCB3		7.34	pg of Hg		
1100171-CAL8	25.00	25.07	pg of Hg	100%	
1100171-CCV1	500.0	463.2	pg of Hg	93%	77-123
1100171-CCV2	500.0	485.6	pg of Hg	97%	77-123

Project ID: DUK-HV1101
PM: Tiffany Stilwater

Client PM: Jay Perkins
Client PO: 141391

Sample Containers

Lab ID: 1111043-01
Sample: BioReactor 1 Inf
Report Matrix: FGD Wastewater
Sample Type: Sample
Collected: 03/09/2011
Received: 03/11/2011

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-T	250 mL.	71281400 20	None	N/A		Cardboard Box

Lab ID: 1111043-02
Sample: Hg Blk BioReactor 1 Inf
Report Matrix: DIW
Sample Type: Field Blank
Collected: 03/09/2011
Received: 03/11/2011

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-T	250 mL.	71138980 50	None	N/A		Cardboard Box

Lab ID: 1111043-03
Sample: BioReactor 2 Inf
Report Matrix: FGD Wastewater
Sample Type: QC Sample
Collected: 03/09/2011
Received: 03/11/2011

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-T	250 mL.	71281400 20	None	N/A		Cardboard Box

Lab ID: 1111043-04
Sample: Hg Blk BioReactor 2 Inf
Report Matrix: DIW
Sample Type: Field Blank
Collected: 03/09/2011
Received: 03/11/2011

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-T	250 mL.	71138980 50	None	N/A		Cardboard Box

Lab ID: 1111043-05
Sample: BioReactor 2 Eff
Report Matrix: FGD Wastewater
Sample Type: Sample
Collected: 03/09/2011
Received: 03/11/2011

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-T	250 mL.	71281400 20	None	N/A		Cardboard Box

Lab ID: 1111043-06
Sample: Hg Blk BioReactor 2 Eff
Report Matrix: DIW
Sample Type: Field Blank
Collected: 03/09/2011
Received: 03/11/2011

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-T	250 mL.	71138980 50	None	N/A		Cardboard Box

Project ID: DUK-HV1101
PM: Tiffany Stilwater

Client PM: Jay Perkins
Client PO: 141391

Shipping Containers

Cardboard Box

Received: March 11, 2011 8:30
Tracking No: 4726 7965 8377 via FedEx
Coolant Type: None
Temperature: ambient

Description: Cardboard Box
Damaged in transit? No
Returned to client? No

Custody seals present? Yes
Custody seals intact? Yes
COC present? Yes

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

Duke Energy

Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd
Huntersville, N. C. 28078
(704) 875-5245
Fax: (704) 875-4349

Analytical Laboratory Use Only

LIMS # J1103002 | Sample Class ASHBAS | Samples Originating From NC X SC ___

Logged By | Date & Time | SAMPLE PROGRAM: Ground Water ___ NPDES ___ Drinking Water ___ UST ___ RCRA Waste ___

Vendor | Cooler Temp (C) < 1

[19]Page 2 of 2
DISTRIBUTION
ORIGINAL to LAB,
COPY to CLIENT

Customer must Complete

[1]Project Name: Belews - FGD WWTS (2010, Bi-Weekly Sampling)		[2]Phone No:
[2] Client: Bill Kennedy, Melonie Martin, Wayne Chapman, Tom Johnson *		[4]Fax No:
[5]Business Unit:	[6]Process:	Mail Code:
[8]Oper. Unit:	[9]Res. Type:	[10]Reso. Center:

Brooks Rand
PO#141391

[15]Preserv.: 1=HCL 2=H_2SO_4 3=HNO_3 4=Ice 5=None

Customer to complete all appropriate non-shaded areas.

Customer to complete appropriate columns to right

LAB USE ONLY [11]Lab ID	Se Speciation Bottle ID	[13]Sample Description or ID	Sampling conducted: 2nd Wednesday each month Date	Time	Signature	[17]Comp.	[18]Grab	[16]Analyses Required: Hg 1631 (sample 2nd week)
2011005017		BioReactor 1 Inf	3-9-11	1250	Dave Mai		X	1
18		Hg Blk BioReactor 1 Inf		1				1
19		BioReactor 2 Inf		1300				1
20		Hg Blk BioReactor 2 Inf		"				1
21		BioReactor 2 Eff		1255				1
22		Hg Blk BioReactor 2 Eff	"	"	"		X	1

Use the Bioreactor 2 Inf or EFF sample as the MS/MSD

Customer to sign & date below - fill out from left to right.

1) Relinquished By: Dave Mai 3-9-11	Date/Time: 1500	2) Accepted By: Cindy Knox 3-9-11	Date/Time: 1500
3) Relinquished By:	Date/Time:	4) Accepted By:	Date/Time:
5)Relinquished By:	Date/Time:	6)Accepted By: [illegible] 3/11/2011	Date/Time: 0830
7)Relinquished By: cpk	Date/Time: 3-10-11 1300	8)Accepted By:	Date/Time:
9)Seal/Locked By: cpk	Date/Time: 3-10-11	10) Seal/Lock Opened By:	Date/Time:
11)Seal/Locked By:	Date/Time:	12)Seal/Lock Opened By:	Date/Time:

Comments: * Metals=As, Ag, B, Cu, Cr, Ni, Se, Zn *thomas.d.johnson@siemens.com

Customer, IMPORTANT! Please indicate desired turnaround.

[22]Requested Turnaround
14 Days ___
*7 Days ___
*48 Hr 3-21-11
*Other ___
* Add. Cost Will Apply

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd
Huntersville, N. C. 28078
(704) 875-5245
Fax: (704) 875-4349

Analytical Laboratory Use Only

LIMS # J11030102 | Sample Class ASHBAS other | Samples Originating From NC X SC ___

Logged By cpt | Date & Time 3-10-11 1238 | SAMPLE PROGRAM Ground Water ___ NPDES ___ Drinking Water ___ UST ___ RCRA Waste ___

Vendor AS&C | PO#ISW01.1894 | < 1 Cooler Temp (C)

AS&C PO#133241

DISTRIBUTION
ORIGINAL to LAB,
COPY to CLIENT

Customer must Complete

1)Project Name: Belews - FGD WWTS (2010, Bi-Weekly Sampling)		2)Phone No:
2) Client: Bill Kennedy, Melonie Martin, Wayne Chapman, Tom Johnson *		4)Fax No:
5)Business Unit:	6)Process:	Mail Code:
8)Oper. Unit:	9)Res. Type:	10)Reso. Center:

Customer to complete all appropriate non-shaded areas.

Sampling conducted: 2nd and 4th Wednesday

15 Preserv.: 1=HCl 2=H_2SO_4 3=HNO_3 4=Ice 5=None

16 Analyses Required

LAB USE ONLY 11 Lab ID	Se Speciation Bottle ID	13 Sample Description or ID	Date	Time	Signature	17 Comp.	18 Grab	TDS (FTIS#) 4	Hg - 245.1 3,4	Metals* 4	Se, soluble 3,4											Se, speciation - vendor to AS&C (Important to place filled bottle back into both baggies) 4					
2011005006	B08843	FGD Purge Eff	3/9/11	8:00	J-Tab			1	1	1	1											1					
07		EQ Tank Eff.	3/9/11	8:05	J-Tab				1	1	1																
08	B08165	BioReactor 1 Inf	3/9/11	8:10	J-Tab					1	1											1					
09		BioReactor 2 Inf	3/9/11	8:15	J-Tab					1																	
10	B06461	BioReactor 2 Eff	3/9/11	8:20	J-Tab				1	1												1					
12		Filter Blk	3/3/11	1300	L. Davis						1																
11	B08165	Metals Trip Blk	3/3/11	1300	L. Davis					1												1					

Customer to complete appropriate columns to right.

Customer to sign & date below - fill out from left to right.

1) Relinquished By	Date/Time	2) Accepted By: Dave Main	Date/Time 3-9-11 1505
3) Relinquished By: Dave Main 3-9-11	Date/Time 1500	4) Accepted By: Cindy Knox 3-9-11	Date/Time 1500
5)Relinquished By	Date/Time	6)Accepted By:	Date/Time
7)Relinquished By: cpt	Date/Time 3-10-11 1300	8)Accepted By:	Date/Time
9)Seal/Locked By: cpt	Date/Time 3-10-11	10) Seal/Lock Opened By	Date/Time
11)Seal/Locked By	Date/Time	12)Seal/Lock Opened By	Date/Time

Comments: * Metals=As, Ag, B, Cu, Cr, Ni, Se, Zn * thomas.d.johnson@siemens.com

Customer, IMPORTANT! Please indicate desired turnaround.

22 Requested Turnaround

14 Days ___
*7 Days 3-21-11
*48 Hr ___
*Other ___
* Add. Cost Will Apply